30 years of flow injection analysis – and passing the torch (Editorial)

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Published in:
Analytica Chimica Acta

Link to article, DOI:
10.1016/j.aca.2006.10.018

Publication date:
2007

Editorial: **30 years of flow injection analysis – and passing the torch.**

If we take a look at the chemical procedures which in the past succeeded to become national and international standards, they are predominantly based on chemistries with fast kinetics, although a few methods, among them the very well known determinations of phosphate or silicate, are notable exceptions. The reason for this is simply that they were all based on using the batch approach, where the manual handling implied poor reproducibility of timing, and therefore it was necessary to reach a steady-state signal, implying that physical homogenisation had to be attained and all chemical reactions had to reach equilibrium.

With the advent of flow injection analysis (FIA), the picture shifted radically, because with its inherent reproducible and accurate timing we could now exploit transient signals rather than rely on steady-state conditions. Not only did FIA allow existing methods to be performed much faster, but, more importantly, it opened up for allowing entirely novel and unique procedures to be developed. Thus, to mention a few, one can point to exploitation of bio- and chemiluminescence; basing our measurement on short-lived, meta-stable constituents; exploiting kinetic discrimination schemes; measuring metals that can form hydrides, which inherently are prone to severe interferences when analysed in the conventional way; or performing sophisticated enzymatic assays aimed either on determining selected substrates or measuring enzyme activities. In this context I cannot but think of the comment that my old American friend Gil Pacey said in the mid-80'es when using kinetic discrimination for one of his procedures: "This is but one example of how FIA can improve the selectivity of a given analytical determination. Not only can existing methods be improved, but new methods that could not have been developed without FIA can be utilised. This raises the interesting question: How many of the older chemical methods were discarded because of non-selective behaviour or difficult handling under batch conditions? A careful inspection of their chemistry is in order. It is possible that under FIA conditions these reagents may have another useful life".

Time has proven him right. Thus, at the time of Flow Analysis X, more than 16.500 papers have appeared in the international scientific literature and in a multitude of languages, to which should be added more than a couple of dozens of monographs plus hundreds of Ph.D. theses. When scrutinizing these publications, one can indeed find some "old and discarded" chemistries. The reason for their revitalisation relies on the fact that in FIA we can intelligently exploit the interplay between thermodynamics and kinetics, which, in turn, essentially gives us an extra degree of freedom to make use of. Examples of this are apparent in this special issue of *Analytica Chimica Acta*.

As it happens, I have (as far as I can figure out as the only one) attended all the Flow Analysis conferences from their start in 1979 in Amsterdam, as organized of Wim van der Linden, and until the tenth one in 2006 in Porto. This in turn implies that I have become an old timer, ready to leave the scene to others, and that is the reason that I have selected the above title for my editorial, just as I chose that title for my lecture at the conference. Therefore, it was a great pleasure to me to see that so many young persons attended FA X, ensuring that we have a vast potential to carry on the analytical chemical research in the field that we all share. Also, I was impressed of the lectures presented, although I, as "purist" chemist, could have wished that more emphasis had been placed on chemistry rather than on hard- and software.

The reason for this "lamentation" is that in my opinion the most original advances in FIA, and its sequels sequential injection analysis (SIA) and Lab-on-Valve (LOV), definitely are to be found in exploiting intelligent chemistries. Thus, after all, we should not forget that we, as chemists, are relying on chemistry and not exclusively on methods/procedures, allowing us to device novel analytical avenues. I am fully aware that it is a challenge, but I am also confident that the young generation is fit to meet it. The posters presented at FA X were ample proofs of this.

The organizers of FA X, Professor J. L. Costa Lima, his colleagues and not the least his crew of helpful and enthusiastic students, are to be congratulated for orchestrating an excellent conference, which inevitably places a severe pressure on the committee preparing the next Flow Analysis conference in Mallorca in 2009.

With my very best wishes for the future of FIA/SIA/LOV and looking forward to follow it from the sideline,

Elo Harald Hansen